TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P77

Overall secondary plant efficiency will decrease if...

A. additional moisture is removed from the steam entering the turbine.

B. the temperature of the feedwater entering the steam generator is increased.

C. the amount of condensate depression (subcooling) in the main condenser is decreased.

D. the temperature of the steam at the turbine exhaust is increased.

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P277

Which of the following will cause overall plant efficiency to increase?

A. Increasing total steam generator blowdown from 30 gpm to 40 gpm

B. Changing steam quality from 99.7% to 99.9%

C. Bypassing a feedwater heater during normal plant operations

D. Increasing condenser pressure from 1 psia to 2 psia

ANSWER: B.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P378 (B3578)

Steam turbines X and Y are identical 100% efficient turbines that exhaust to a condenser at 1.0 psia. Saturated steam at 250 psia enters turbine X. A moisture separator/reheater supplies turbine Y with superheated steam at 250 psia and 500°F.

Which one of the following lists the percentage of moisture at the exhaust of turbines X and Y?

	Turbine X	Turbine Y
A.	24.5%	20.5%
B.	26.3%	13.0%
C.	24.5%	13.0%
D.	26.3%	20.5%

ANSWER: A.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P379

Which one of the following actions will decrease plant efficiency?

A. Reducing turbine inlet steam moisture content

B. Reducing condensate depression

C. Increasing turbine exhaust pressure

D. Increasing temperature of feedwater entering the steam generators

ANSWER: C.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P478

To achieve maximum secondary plant efficiency, feed water should enter the steam generator (S/G) _____ and the pressure difference between the S/G and the condenser should be as _____ as possible.

A. as subcooled as practical; great

B. as subcooled as practical; small

C. close to saturation; great

D. close to saturation; small

ANSWER: C.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P878

Feed water heating increases secondary plant efficiency because...

A. the average temperature at which heat is transferred in the steam generators is increased.

B. less steam flow passes through the turbine, thereby increasing turbine efficiency.

C. increased feed water temperature lowers the temperature at which heat is rejected in the condenser.

D. less power is required by the feed water pumps to pump the warmer feed water.

ANSWER: A.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P978

Which one of the following changes will cause an increase in plant efficiency?

A. Decreasing the temperature of the water entering the steam generators

B. Decreasing the superheat of the steam entering the low pressure turbines

C. Decreasing the circulating water flow rate through the main condenser

D. Decreasing the concentration of noncondensible gases in the main condenser

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1078

A nuclear power plant is operating at full power with 0°F of condensate subcooling. If main condenser cooling water inlet temperature increases by 3°F, secondary steam cycle efficiency will...

A. decrease due to a degraded main condenser vacuum.

B. increase due to an improved main condenser vacuum.

C. decrease due to increased main condenser heat rejection.

D. increase due to decreased main condenser heat rejection.

ANSWER: A.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1378

Which one of the following actions will result in a decrease in secondary plant efficiency?

A. Increasing steam quality by adding additional heat to the steam prior to entering the turbine

B. Increasing the temperature of the feed water entering the steam generator

C. Decreasing the amount of condensate depression in the main condenser

D. Decreasing the amount of turbine steam extracted for feed water heating

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1478

Turbine X and turbine Y are ideal steam turbines that exhaust to a condenser at 1.0 psia. Turbine X is driven by saturated steam (100% quality) at 900 psia. Turbine Y is driven by superheated steam at 500 psia and 620°F.

The greatest amount of work is being performed by turbine _____, and the greatest moisture content exists in the exhaust of turbine _____.

A. X; Y

B. X; X

C. Y; Y

D. Y; X

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1678

Turbine X and turbine Y are ideal steam turbines that exhaust to a condenser at 1.0 psia. Turbine X is driven by saturated steam (100% quality) at 500 psia. Turbine Y is driven by saturated steam (100% quality) at 700 psia.

The greatest amount of specific work is being performed by turbine _____; the greatest moisture content exists in the exhaust of turbine _____.

A. X; X

B. X; Y

C. Y; X

D. Y; Y

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1878 (B1879)

A reactor plant is operating at 85% reactor power when the extraction steam to a high-pressure feedwater heater is isolated. After the transient, the operator returns reactor power to 85% and stabilizes the plant. Compared to conditions just prior to the transient, current main turbine generator output (MWe) is...

A. higher because increased steam flow is causing the turbine to operate at a higher speed.

B. lower because decreased steam flow is causing the turbine to operate at a lower speed.

C. higher because plant efficiency has increased.

D. lower because plant efficiency has decreased.

ANSWER: D.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P1980 (B1679)

What is the long-term effect of isolating extraction steam to a high-pressure feedwater heater while at 85% of rated power? (Assume a constant turbine load.)

A. Reactor power (MWt) increases and overall plant efficiency increases.

B. Reactor power (MWt) increases and overall plant efficiency decreases.

C. Reactor power (MWt) decreases and overall plant efficiency increases.

D. Reactor power (MWt) decreases and overall plant efficiency decreases.

ANSWER: B.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2078

A plant is operating at 90% of rated power. Main condenser pressure is 1.7 psia and hotwell condensate temperature is 120°F.

Which one of the following describes the effect of a 5% decrease in cooling water flow rate through the main condenser?

A. Overall steam cycle efficiency will increase because the work output of the turbine will increase.

B. Overall steam cycle efficiency will increase because condensate depression will decrease.

C. Overall steam cycle efficiency will decrease because the work output of the turbine will decrease.

D. Overall steam cycle efficiency will decrease because condensate depression will increase.

ANSWER: C.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2178 (B2178)

If superheating of the inlet steam to a low pressure turbine is reduced, low pressure turbine work output will _____ and low pressure turbine exhaust steam moisture content will _____. (Assume steam flow rate does not change.)

A. remain the same; increase

B. remain the same; decrease

C. decrease; increase

D. decrease; decrease

ANSWER: C.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2278

If the moisture content of the steam supplied to a main turbine increases, (assume no change in steam pressure, condenser pressure, or control valve position) turbine work will...

A. decrease, because the enthalpy of the steam being supplied to the turbine has decreased.

B. decrease, because moist steam results in more windage losses in the turbine.

C. increase, because the enthalpy of the steam being supplied to the turbine has increased.

D. increase, because moist steam results in less windage losses in the turbine.

ANSWER: A.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2478

Turbine X is an ideal steam turbine that exhausts to a condenser at 1.0 psia. Turbine X is driven by saturated steam (100% quality) at 500 psia. Which one of the following lists the approximate specific work output of turbine X and the moisture content of the steam exiting turbine X?

	Specific Work	Moisture Content
A.	388 Btu/lbm	72%
B.	388 Btu/lbm	28%
C.	817 Btu/lbm	72%
D.	817 Btu/lbm	28%

ANSWER: B.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2678 (B1978)

If the moisture content of the steam supplied to a turbine decreases, steam cycle efficiency will increase because the...

A. enthalpy of the steam being supplied to the turbine has increased.

B. mass flow rate of the steam through the turbine has increased.

C. reheat capacity of the turbine extraction steam has increased.

D. the operating temperature of the turbine blading has increased.

ANSWER: A.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P2778 (B2774)

The theoretical maximum efficiency of a steam cycle is given by the equation:

$$Eff_{thmax} = (1 - T_{out}/T_{in}) \times 100\%,$$

where T_{out} is the absolute temperature for heat rejection and T_{in} is the absolute temperature for heat addition. (Fahrenheit temperature is converted to absolute temperature by adding 460°.)

A plant is operating with a stable steam generator pressure of 900 psia. What is the approximate theoretical maximum steam cycle efficiency this plant can achieve by establishing its main condenser vacuum at 1.0 psia?

A. 35%

B. 43%

C. 57%

D. 65%

ANSWER: B.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P3078 (B3077)

Which one of the following will be caused by a decrease in main condenser vacuum (higher absolute pressure) on a plant operating at full power? (Assume main steam flow rate and condenser circulating water flow rate are unchanged.)

A. Decrease in the condensate temperature

B. Decrease in the ideal steam cycle efficiency

C. Decrease in the condensate pump required NPSH

D. Decrease in the mass of noncondensable gas in the condenser

ANSWER: B.

TOPIC: 193005
KNOWLEDGE: K1.03 [2.5/2.6]
QID: P3378 (B2478)

A reactor plant was initially operating normally at 90% reactor power when heating steam (supplied from main turbine extraction steam) to the feedwater heaters was isolated. The plant was stabilized and reactor power was returned to 90%.

As compared to the initial main generator output (MW), the current generator output is...

A. lower, because the steam cycle is less efficient.

B. higher, because the steam cycle is less efficient.

C. lower, because more steam heat energy is available to the main turbine.

D. higher, because more steam heat energy is available to the main turbine.

ANSWER: A.